

Soil pH and Lime

When considering soil health, the most important concern should be the pH of the soil. Very acidic soils may produce high concentrations of soluble iron and manganese, which may reduce the growth of sugarcane either directly or through their antagonistic effect on the availability of other nutrients especially phosphorus. Phosphorus availability is affected in acidic soils through the formation precipitates in reaction to high levels of iron, aluminium, and manganese. The most common micronutrient deficiencies in acidic soils are molybdenum and selenium. Fertiliser use efficiency or the crop response to fertiliser nutrients is very low in acid soils, an example of such being nitrogen availability becoming very low due to reduced microbial activities and fewer microbial processes that are responsible for nitrogen conversions. Soil pH also affects the biochemical processes of sugar formation and consequently the quality of sugar produced in sugarcane. Soil pH has a significant effect on the activities of microorganisms, such as bacteria and fungus, and macro-organism (earthworms) that are found in the soil. Microorganisms are responsible for organic matter decomposition and the availability of nutrients in soil.

The optimum growth of most crops occurs in the pH range 6 to 7. If soil pH is below this range the excess acidity needs to be neutralised and the pH should be raised. This can be achieved through a procedure called "liming". Liming is the primary method for correcting soil pH; however, the application of lime has several other benefits to improve crop health and yield. The primary benefit of the application of lime is the adjustment of soil pH to improve fertiliser use efficiency by maximising nutrient availability.

The lime reaction rate will depend primarily on the quality of the lime. Lime quality is determined on two factors, the chemical purity of the liming material and the particle size distribution. Chemical purity is expressed as the calcium carbonate equivalent (CCE) of the liming material. Pure calcium carbonate has a CCE of 100%, and generally lime recommendations are made on the assumption that the liming material being used has a CCE of 100%. If your material has a CCE less than 100%, you will have to apply more lime. Particle size distribution is also essential in the liming process. Small lime particles will react more quickly and larger lime particles more slowly. It is ideal if the liming material used has a variation of particle sizes, with finer particles to quickly raise the soil pH and slightly more coarse particles to provide longer term soil pH control. Coarse and very coarse particles are not ideal, due to their extended reaction time. Typically, with a good quality lime, the most significant change in pH occurs within three to four months after application, with the pH possibly increasing for up to six to 12 months post application.

Why you need to apply lime.

- The ideal pH range for growth and nutrient uptake for sugarcane is pH 5.5 – 6.5.
- Lime application corrects low soil pH through a chemical reaction. Fine lime particles achieve the best results in a shorter period.
- Ideal soil pH improves fertiliser use efficiency by maximising nutrient availability.
- It takes three to four months after the application of lime for the soil pH to improve.
- Soil testing as soon as possible after harvest allows for the best possible timing to achieve the benefits of lime application.

For more information, please contact Stacey and Frank at SSP